AD NUMBER
AD007583
LIMITATION CHANGES
TO: **Approved for public release; distribution is unlimited.**
FROM: **Distribution authorized to DoD only; Administrative/Operational Use; 22 JUL 1952. Other requests shall be referred to Office of Naval Research, Arlington, VA 22203. Pre-dates formal DoD distribution statements. Treat as DoD only.**
AUTHORITY
ONR ltr dtd 26 Oct 1977

AD _____

SEMI-ANNUAL PROGRESS REPORT

Date July 22, 1952

For period January 1, 1952
to June 30, 1952

NR: 132185

CONTRACT: N6 ori-220 Task Order No. 2

ANNUAL RATE: $6,000.00

CONTRACTOR: University of Kansas, Lawrence, Kansas

PRINCIPAL INVESTIGATOR: Charles D. Michener (with co-operation of E. Raymond Hall

Assistants: Richard B. Loomis D. A. Crossley

Keith A. Wolfenbarger E. H. Kardos

TITLE OF PROJECT: Biology and Host Relation of Trombiculid Mites.

I. Objectives: Chiggers or Trombiculid Mites are the vectors of Scrub Typhus and are one of the vectors of Murine or Endemic Typhus. Moreover, they are pests of major importance. In spite of these facts, less is known of them than of any other group of medically important arthropods. Although they must be reared to study disease transmission, little was known of their life histories or of rearing techniques when this project began. A complete study of the Trombiculid mites of the central United States was undertaken with the following aims: 1. To conduct life history studies in the laboratory and ecological studies in the field for each species, and obtain exhaustive biological data with the practical objectives of learning rearing techniques and field ecological relationships: 2. To correlate and describe the various steges for each species and compare the corresponding stages of the available species, so that chigger species can be recognized from any stage discovered in the field: 3. To complete taxonomic studies, describe and name, if necessary, the larvae of each species under investigation, since proper identification is of primary importance, so that other investigations can be correlated; 4. To make complete host lists for all species of chiggers, determining the most important hosts for each species; and 5. To determine if any diseases in this area are carried and transmitted to the hosts of larval chiggers.

II. Summary of Results

a. Since start of project: At the beginning of our study it was supposed that a dozen or less species would be found in our area. Intensive collecting has revealed approximately 60 species of chiggers in Kansas and adjoining states. This has greatly increased the amount of work necessary to complete the project. More than 12,000 specimens of 250 species and subspecies of

amphibians (60 forms), reptiles (20 forms), birds (70 forms) and mammals (70 forms) from the central United States have been examined for chiggers since the beginning of the project in 1947. Nearly 225,000 chiggers have been recovered, representing approximately 60 chigger species; 16,000 of these larvae have been mounted on slides, 75,000 have been preserved, and most of the rest were placed in cultures for rearing studies. Several hundred nymphs and adults have been reared, and are preserved or mounted.

An excellent washing method for larval chigger recovery has been developed. Also, valuable data have been obtained on culturing or rearing chiggers through all stages. One important discovery was a suitable food (Collembola and their eggs) for the nymphal and adult chiggers. Suitable rearing chambers have also been developed. These developments are extremely important in connection with rearing of chiggers used in disease experiments.

Systematic studies have been completed on Acomatacarus, Trombicula (Eutrombicula), Pseudoschongastia and Speleocola have been or are being published.

Ecological studies on Eutrombicula and Neotrombicula have progressed satisfactorily and will result in a Ph. D. thesis (by Mr. Loomis), and an M. A. thesis (by Mr. Kardos).

Host lists for those chigger species identified and described (especially Eutrombicula, Acomatacarus, Pseudoschongastia and Speleocola) have been made and are being published in connection with the systematic studies. Such a list for Neotrombicula will soon be published.

b. During Current Report Period: Mr. Richard B. Loomis is studying the ecology of pest chiggers, especially the extent and effect of chigger parasitism upon reptiles. Investigations have been continued at the University of Kansas Natural History Reservation, with reptiles and mammals being examined. A species of chigger, Trombicula gurneyi Ewing, commonly found attached upon reptiles, has been studied in more detail both in the field and also in the laboratory. The unengorged unattached larvae have been found in a restricted habitat of rotten wood on or around rotten logs or dead upright trunks. They have been successfully sampled with the black plastic samplers. This year the common chigger Trombicula (Eutrombicula) alfreddugesi appeared on May 29, 1952 at the Reservation, nearly the same date as the appearance in 1951.

Collection of data for this study has been virtually completed; therefore much of the time has been spent in interpreting the data and assembling the material.

Studies on nymphal and adult morphology, undertaken by Mr. D. A. Crossley, Jr., are progressing satisfactorily towards a system of classification based on post-larval forms. Studies on the subgenus Eutrombicula and several related forms are virtually completed; in addition, collection and rearing of post-larval stages for study have been successfully conducted. Particularly successful were cultures of a species of the genus Walchia; one culture yielded over forty post-larval forms. A large number of adult mites of the

subgenus Eutrombicula collected in the field were cultured by means of refined techniques to provide for the compilation of valuable data concerning various features of the egg-laying habits and variation in eggs, deuova, and larvae. Post-larval material has also been obtained by rearing in the genera Euschongastia, six species; Hannemania, two species; Pseudoschongastia, one species; Trombicula (Neotrombicula), one species; Trombicula (Eutrombicula), two species; and Trombicula sensu latu, two species. Five additional species successfully cultured are not as yet assigned to genus.

Mr. Louis J. Lipovsky is completing his thesis on chigger life histories. He is not now on the project payroll.

Mr. Keith Wolfenbarger worked on the project until June 1, 1952. He identified Trombicula (Eutrombicula)and worked upon the histology of the various stages of these chiggers. He will return to complete the histological study in the fall.

Mr. E. H. Kardos is studying the taxonomy and ecology of the chiggers, subgenus Neotrombicula, in the Central United States. The taxonomic studies are based upon the specimens in the collection at the University of Kansas. The ecological studies are concerned with the local species; they will include data on hosts, habitat of nymphs and adults, and seasonal occurrence, principally at the University of Kansas Natural History Reservation.

In connection with the studies of the Rocky Mountain region one new species will be described and a New World record of the European Trombicula (N.) autumnalis will be listed.

III. Plans for future:

Immediate:

1. Completion of the studies listed under IIb above, with special emphasis on certain aspects, as listed below.

2. Continued biological studies of numerous species, especially Trombicula (Neotrombicula), the winter chiggers.

3. Descriptions of approximately 20 new species and several new genera and subgenera, so that the names can be used in correlating the data being obtained.

4. Describe and correlate the available stages of chiggers.

Publications In Press, Submitted since January 1, 1952

Jones, J. K. jr., R. B. Loomis, et al.

New records of bats from Northeastern Kansas, with notes on the bat chigger, Euschongastia pipistrelli (Acarina, Trombiculidae).

Trans. Kans. Acad. Sci.

Lipovsky, L. J.

--A new genus and species of chigger mite (Acarina, Trombiculidae).

Jour. Kans. Ent. Soc.

--Polyvinyl alcohol with lacto-phenol, a mounting and clearing medium for chigger mites. Ent. News.

--Improved technique for rearing chigger mites (Acarina, Trombiculidae).

Ent. News.

Loomis, R. B., and D. A. Crossley

--A New species of Chigger from eastern Kansas. (Acarina, Trombiculidae).

Jour. Kans. Ent. Soc.

Charles D. Michener
Principal Investigator